

# Science, Technology and National Socialism

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# 1

## *Scientists, engineers and National Socialism*

MONIKA RENNEBERG and MARK WALKER<sup>1</sup>

The three related yet separate parts of this essay move from the general to the specific: (1) science and technology are placed in the context of National Socialist Germany by means of a model based on Franz Neumann's *Behemoth*; (2) the main unifying theme of this book, 'continuity and discontinuity', is analysed; and (3) the contents of this volume are surveyed, including a brief description of each essay.

### 1      **Behemoth revisited**

#### 1.1      *Behemoth*

How did scientists and engineers fare under National Socialism? Did Hitler's regime accelerate or obstruct the push towards technocracy in Germany which was both already prominent during the Weimar Republic and inherent in modern science and technology? How did technocracy affect science and engineering? These questions are interconnected: an investigation of science and technology under Hitler facilitates an understanding of technocracy; an examination of technocracy in turn illuminates the structure of the Third Reich; and finally the structure of the National Socialist state provides insight into science and technology. This essay suggests a model for National Socialism which hopefully will give both answers to these questions and stimulate further inquiry.

In 1942 the émigré social scientist Franz Neumann proposed a suggestive and insightful model of National Socialism as a cartel of power blocs, including the Army, Big Business, the Civil Service and the National Socialist German Workers party (*Nationalsozialistische Deutsche Arbeiterpartei*, henceforth NSDAP): the *Behemoth*, or un-state.<sup>2</sup> These blocs sometimes cooperated, sometimes conflicted, always competed with each other, and

combined to form National Socialism. The tensions between them produced much of the dynamic energy that ran the regime.<sup>3</sup> This model of a cartel of power blocs also tacitly argues that other groups were powerless: the working class, the churches, women, and so on.

In a recent study of Adolf Hitler's power, Ian Kershaw has demonstrated<sup>4</sup> that these power blocs – like most individuals or organizations during the Third Reich – accessed power only through the fulcrum of the *Führer*. Thus one could argue that the cartel of power blocs operated through and around Hitler like spokes around the hub of a wheel. This image of the power cartel allows a marriage of the intentionalist and the functionalist approaches to the structure of the Third Reich.<sup>5</sup> The fact that power and authority originated with Hitler or had to go through him – as a prominent National Socialist explained in 1934, it was 'the duty of everybody to try to work towards the Führer along the lines he would wish'<sup>6</sup> – does not necessarily mean that he was in control. If Hitler's power was the hub of National Socialism, he still could behave either as master in his Reich or as a weak dictator, depending on the context and the power blocs involved.<sup>7</sup>

The contrasting fates of rockets and nuclear weapons research during the Third Reich provide an example of the limits of Hitler's power.<sup>8</sup> For any major research and development project to be successful, it had to be approved by Hitler. However, the fact that Hitler's approval was necessary does not mean that his ability to make definitive decisions was sufficient. The rocket project's enthusiastic supporters managed to force their pet project onto Hitler's agenda, including a personal audience. Hitler was sceptical at first, but eventually became convinced, so that the project was supported. The nuclear weapons project was effectively frozen at the laboratory level of research, far down the ladder of command from Hitler, so that Hitler was merely informed of its existence. In the former case, Hitler found himself in a position to make a decision, and he did; in the latter case, Hitler was never presented with an opportunity to say yes or no.

It is not enough to recognize the central role played by Hitler's power in the Third Reich. The members of this cartel also should be revised, for several reasons. Neumann could not have foreseen how the SS (*Schutzstaffeln*, loosely translated as 'defense squadron') would expand into its own empire, that a plethora of special agencies devoted to specific (and often overlapping) tasks would grow within the German state like a cancer, or how the war economy would affect Germany and the occupied or annexed territories. The revised power cartel includes the different branches of the Armed Forces (Army, Navy and Air Force); Big Business; the Civil Service; the NSDAP (both the central organization and the regional satrapies of the Party *Gauleiter*,); the SS; and the various spheres of 'Führer power': Hermann Göring's Four Year Plan; the Todt Organization and its successor, Albert Speer's Ministry of Armaments and later War Production; the

Hitler Youth organization; the occupation governments in occupied Europe.<sup>9</sup> The effectiveness of a bloc depended on two main factors: relative strength and relative autonomy, or, in other words, the ability to cooperate as well as to compete.

The relative position of the blocs changed with the evolution of the Third Reich. The Armed Forces were strong throughout, were quite independent until 1938, but lost almost all independence after the winter of 1941–2.<sup>10</sup> Big Business was strong throughout, but beginning in 1936 and especially from 1939 onwards it became more and more entangled in the political, military and ideological goals and policies of National Socialism; strength did not necessarily imply independence, for although Big Business in Germany regained some autonomy (parallel to science and technology) during the war and certainly prospered, it was often in a way not wholly of the businessmen's own choosing.<sup>11</sup> The Civil Service steadily lost independence and power;<sup>12</sup> the NSDAP was strong and independent up until the very end;<sup>13</sup> the power and independence of the SS grew steadily.<sup>14</sup>

Neumann had probably conceived the blocs as discrete and autonomous, but in fact, as Michael Geyer has pointed out, the opposite was true.<sup>15</sup> Some blocs were relatively clearly defined and bounded, like the Armed Forces. Membership of the NSDAP was suspended when an individual began active military service. But even the autonomy of this bloc was compromised by the introduction of *Waffen-SS* units and 'political' officers during the war. In fact, the second adaptation to be made to Neumann's theory is to recognize that most blocs overlapped with each other to a considerable degree. Thus the image of a spoked wheel is not completely satisfactory because the spokes were not distinct and separate.

Exactly how the power blocs overlapped can best be seen by examining individuals. For example, Rudolf Mentzel and Erich Schumann,<sup>16</sup> important science policy-makers in the Third Reich, were connected to several blocs. Mentzel, an Old Fighter of the Party and honorary member of the SS, carved out a mini-empire within the Reich Ministry of Education which included control over the Reich Research Council and the German Research Foundation, conduits for most of the funds given to scientific research. Schumann, a professor at the University of Berlin and one of the many opportunists who rushed to join the Party in the spring of 1933, held influential positions in the Ministry of Education and headed the research branch of Army Ordnance. Similarly one could take Carl Krauch, an I. G. Farben executive hired by Göring to run the Four Year Plan, who at times worked closely with the SS and Speer's ministry.<sup>17</sup> It is striking that these 'middle managers', who often wielded considerable power in the National Socialist state precisely because of their divided loyalties, have been relatively neglected by historians.

But even if the power blocs were not distinct, the cartel model is nevertheless useful because the National Socialist state was to a considerable

degree divided up into relatively autonomous groups. The great majority of individuals making up these blocs did have a dominant or overriding loyalty or responsibility. Thus despite Mentzel's ties to the party and the SS, his power base lay in the Education Ministry and he generally worked to further the interests of this ministry; Schumann's real influence and loyalty lay with the Army, not the Civil Service; despite Krauch's longstanding connection to the I. G. Farben colossus and his consequential dealings with the SS, his overriding responsibility and loyalty remained with the economic pseudo-ministry headed by Göring.

Focus on the individual within the power blocs also allows recognition of the fact that ideological groupings existed within this cartel that cut across bloc lines, such as anti-Semitism, anti-Socialism and anti-Communism, nationalism and, most importantly for our purpose, technocracy.<sup>18</sup> These groupings of individuals definitely cut across all the blocs, often overlapped with each other, but usually did not completely cover any bloc. Thus not even the membership of the NSDAP was completely anti-Semitic.

The introduction of ideological groupings in effect multiplies the levels of the power cartel model. Instead of asking how particular blocs cooperated or came into conflict, particular ideological groupings can be studied which owe allegiance both to their power bloc and to common ideology. For example, the debate over the mobilization of German women for the war effort can be interpreted as a conflict between technocrats in various blocs, who wanted to exploit the labour of German women, and another ideological grouping, spread over several blocs as well, which insisted that German women remained limited and foreign forced labor made up the difference.<sup>19</sup>

## 1.2 *Technocracy*

Although this revised model of the National Socialist *Behemoth* may be useful for the Third Reich in general, its main function here is to facilitate understanding of the fate of scientists and engineers under Hitler by means of the concept of *technocracy*, usually defined as the 'management of society by technical experts'.<sup>20</sup> Here the engineers and scientists are the actors, not merely the tools.

The technocratic movement first became influential in the United States of America<sup>21</sup> and subsequently spread to other countries. Technocracy was often considered incompatible with capitalist democracy; a centralized government run by technocrats would be better, with Fascist Italy and National Socialist Germany as possible candidates. But the German technocratic movement<sup>22</sup> encountered a fundamental dilemma at the start of the Third Reich: how to reconcile the international and rational elements of technocracy with the demands of the extremely nationalistic and often irrational Third Reich.

This conflict is perhaps best illustrated by the brief life of the journal *Technokraties* organ of the German Technocratic Society. *Technokratie* first appeared shortly after Adolf Hitler's appointment as German Chancellor in 1933. The first editorial admitted that technocracy had to be accommodated to National Socialism and distinguished from its American counterpart: technocracy was an example of 'German intellectual goods'.<sup>23</sup> The following article, entitled 'German Technocracy', paid lip service to National Socialist 'Blood and Soil' ideology, but also warned that if this ideology was taken too far, then Germany would revert to 'primitive circumstances'.<sup>24</sup>

These two cautiously critical essays were followed in turn by Hans Triebel's analysis of 'National Socialism and Technocracy'. The author and NSDAP member begins with ritual praise for Hitler, who had 'solved' practically all of Germany's economic problems. In other words, Hitler too was a technocrat. However, Triebel also refers to the National Socialist technocrat Gottfried Feder, who probably would have supported the technocratic society, but had already begun his precipitous fall from power within the National Socialist movement. The technocratic society either chose, or was forced to choose the wrong patrons in the Third Reich.

Triebel made great efforts to accommodate technocracy to the requirements of the 'new state'. For example, technocracy was now portrayed as compatible with autarchy – a policy usually pursued for political, not economic or technical reasons. German technocracy's fundamental similarity to technocratic movements in other countries was admitted, but Triebel asserted that this similarity in no way contradicted the staunch nationalism of German technocracy. Most important was Triebel's unconditional abdication of political influence: 'technocracy does not have political ambitions... and does not want technicians to dominate politics...'.<sup>25</sup>

But despite these concentrated efforts to make technocracy more palatable to National Socialism, a survey of the three years *Technokratie* appeared reveals that the German society was in fact dependent on its American counterpart. Very many articles were translations of American articles, not to mention a British article that imprudently praised the physicist Albert Einstein, a special target of National Socialist attacks.<sup>26</sup> The journal section devoted to 'Technocracy around the world' perhaps unwittingly underlined the fundamental conflict between the international technocratic movement and the racist (*völkisch*) nationalism of National Socialist Germany. The journal *Technokratie* and with it the German Technocratic Society came to a sudden end in 1935, ironically just when opportunities for technocrats within the National Socialist state began to improve. The Third Reich had room for individual technocrats, but not for a technocratic movement.

The historian Walter McDougall has proposed a different definition of technocracy: the 'institutionalization of technological change for state

purposes'.<sup>27</sup> Here engineers and scientists are the tools, not the actors, and this technocracy does not necessarily aim at or serve a rational state.<sup>28</sup> McDougall has demonstrated that this concept of technocracy is a valuable way to investigate radically different political and ideological systems by comparing the space race in the post-World War II Soviet Union and United States.<sup>29</sup> Unfortunately, neither of these two definitions for technocracy fits the Third Reich well.

A generation of scholarship has demonstrated the often contradictory, self-destructive and chaotic nature of the Third Reich. National Socialism did not allow technical experts to manage society rationally. Such specialists often had considerable influence, but only as the tools of various power blocs. The Third Reich was also unable to institutionalize technological change for its own purposes: the polycratic cartel of overlapping, competing and contradictory power blocs effectively hindered and sometimes prevented the systematic and thorough development and implementation of specific technologies and policies, let alone technological change in general; for similar reasons coherent and consistent 'state purposes' are hard to find except in a very general sense, such as territorial and economic expansion, a racially 'pure' population, and totalitarian control over every aspect of society. Yet despite the Second World War, the SS police state and genocide, not even these goals were realized.

Perhaps the most striking and novel aspect of technocracy under Hitler was the use of rational means and technocratic principles to achieve both rational and irrational ends. In other words, technocratic methods were decoupled from technocratic goals. State purposes were similarly replaced by the purposes of power blocs or ideological groupings. Thus the main differences between technocracy under National Socialism and elsewhere were: (1) German technocrats were able and willing to help further irrational and thereby un-technocratic goals and policies; (2) clear, coherent and consequent state purposes scarcely existed.

The above discussion has taken for granted that both technically- and scientifically-trained experts could be technocrats. But this assumption ignores a fundamental historiographic conflict: how to judge the relationship between science and technology, between engineers and scientists? Historians and sociologists of science often argue – explicitly or implicitly – that scientists and engineers are comparable, if not equivalent. The transformation of some technologies from trouble-shooting by more or less well-trained inventors to a science-based enterprise was arguably one of the fundamental trends of the first half of the twentieth century and made technology more attractive for some engineers, scientists and state officials. The sociologist Bruno Latour has argued that this transformation has had a profound effect on science as well, leading to what he calls 'technoscience', including both the 'scientification' of technology and the 'technologization' of science.<sup>30</sup>

Historians of technology often argue – sometimes implicitly, without even mentioning science or scientists – that engineers and scientists are fundamentally different and must be treated as such. Since engineers and scientists generally had positions and functions which differed from those of scientists, they may also have a different attitude towards National Socialism and the economic, political and social problems of their time.<sup>31</sup>

The distinction between engineers and scientists clearly breaks down in exceptional circumstances like the second world war, when science was mobilized and applied for the war effort, and science-based military technologies were researched, developed, manufactured and used. Indeed much of the available literature on technology under National Socialism, including the papers in this volume, has been devoted to science-based or military technologies. There are very many aspects of technology and engineering during the Third Reich that have scarcely been examined, but could fruitfully be. The relationship between scientists and engineers remains one of the most important still open questions about science and technology under Hitler.

If we apply the revised *Behemoth* model to technocracy during the Third Reich and interpret the latter as an ideological grouping within several power blocs, then this model facilitates an investigation of the thorny question of the relationship between modernization and National Socialism: did National Socialism deliberately or unintentionally contribute to the modernization of German society?<sup>32</sup> Ian Kershaw, who argues that the concept of modernization is unhelpful for evaluating National Socialism, defines this concept as follows:

As conventionally deployed in sociological and historical writing, 'modernization' implies long-term change spanning centuries and transforming 'traditional' society based on agricultural and artisanal production, personal relations of dependence, local loyalties, rural cultures, rigid social hierarchies, and religious world-views, into industrial class society with highly developed industrial technologies, secularized cultures, 'rational' bureaucratic impersonal socio-political orders, and political systems of mass participation.<sup>33</sup>

Indeed, perhaps the concept of technocracy can be used instead of modernization; the historian need only interpret what looks like modernization as either the relative success of one ideological grouping, the technocratic, in competition with the others, or the cooperation of more than one grouping towards a common goal. For example, as Hans Mommsen has argued, it took both technocrats and anti-Semites to realize the Holocaust: 'if one wants to speak of modernization in the Third Reich, then its specific forms were the perverse applications of medical theories as well as mass extermination engineered with technical means.'<sup>34</sup>

In Germany, as elsewhere, there was a growing tendency towards

technocracy both before and after 1933, and especially during the Weimar Republic.<sup>35</sup> Opposition to technocracy and to rationalization also existed, even in the sciences themselves.<sup>36</sup> There was no inherent contradiction between technocracy and conservative, romantic ideologies, as Jeffrey Herf's study of reactionary modernism demonstrates,<sup>37</sup> and technocrats were scattered throughout German society between the wars, including from the beginning in the National Socialist movement. How else can one explain the sophisticated use of modern technology for propaganda by the NSDAP? Many more technocratic enthusiasts flooded into the Party or ancillary organizations after 1933, and it was these technocratic National Socialists who facilitated the opportunistic marriage of 'Blood and Soil' ideology with the power of the most modern science and technology, thereby making possible the nightmare of the Third Reich: repression, persecution, war and genocide.

The application of the concept of technocracy to the National Socialist period thus merely recognizes that technocrats existed before, during and after Hitler's rule, that they always faced strong practical and ideological opposition, and that this particular conflict played an important role in the history of the Third Reich. How else can we explain the transition from mass shootings to gas chambers,<sup>38</sup> the sterilization<sup>39</sup> and euthanasia campaigns, the propaganda network and the secret police system?<sup>40</sup> In fact the contrast between SS and SA (*Sturmabteilung*, storm troopers) provides a paradigmatic example of conflict between a pro-technocratic (if contradictory) and an anti-technocratic part of the National Socialist movement. Just as the 'Night of the Long Knives' decided this rivalry in favor of the SS,<sup>41</sup> so the technocrats won most of the battles they fought within the polycratic structure of the Third Reich.

The influence of the technocracy grouping grew sharply after the concerted efforts at rearmament accelerated in 1936 and especially after the Lightning War (*Blitzkrieg*) failed in the winter of 1941–2. As we shall see, scientists and engineers benefited as the technocratic grouping within the cartel grew more powerful. Here is one of the insights offered by the Behemoth model: conflict and cooperation between blocs were two sides of the same coin.

If a Party technocrat, an SS technocrat, technocrats from a special agency like the Four Year Plan, the General Government, or Speer's Ministry, and a technocrat from the Armed Forces were to meet together – as, for example, such technocrats did at the Wannsee Conference – they would all see each other as rivals, they would all be jealous representatives of their bloc, but they would all agree that scientific, technological and bureaucratic rationality and efficiency was the way to solve their and Germany's problems, in this case the 'Final Solution of the Jewish Question'. Thus bloc representatives may in certain situations have divided loyalties because of an ideological commitment, with the result that their reaction becomes

unpredictable or at least more complex. In any case, by the end of the war and the 'Thousand Year Reich', technocracy – and with it science and engineering – was emerging as one of the most powerful and last pillars of the National Socialist state.

### 1.3 *Scientists and engineers under Hitler*

The historians and scientists who have studied science and technology during the Third Reich usually focus first of all on two aspects of that experience; (1) the 'synchronization' or 'coordination' (*Gleichschaltung*) of science and engineering carried out during the first years of the new regime,<sup>42</sup> symbolized by Albert Einstein's emigration to the United States,<sup>43</sup> and (2) the so-called 'Aryan' science and technology movements (literally translated as 'German'), which in fact were political movements within individual disciplines that agitated for a more 'German' and 'Aryan' chemistry,<sup>44</sup> mathematics,<sup>45</sup> physics<sup>46</sup> and psychology.<sup>47</sup>

But the common assumption that the National Socialist movement deliberately set out to purge science or engineering in particular is questionable. Most scientists and engineers who were thus affected were purged automatically as a small part of the general National Socialist 'cleansing' of the Civil Service. Moreover, after 1933, since many positions in science and engineering were connected directly or indirectly to the Civil Service, many prospective researchers were also liable to this automatic synchronization.

Einstein is the exception that proves the rule. He drew the attention and ire of the new German rulers precisely because his influence transcended the limits of his profession and affected the political sphere. Parts of Hitler's movement undoubtedly held some parts of science in contempt, but this scorn was not universally applied and was never held for technology.

There were two separate categories for science and engineering from the perspective of National Socialism: (1) those disciplines obviously useful to the Third Reich in an ideological or practical sense, including biology,<sup>48</sup> chemistry, geography and engineering, which hardly need to be synchronized; and (2) other disciplines, such as mathematics, physics and psychology, which now had to demonstrate convincingly their utility for the 'new' Germany. It is no coincidence that the latter disciplines all experienced an 'Aryan' science movement or the equivalent which challenged the existing professional hierarchy, but the former did not. Chemistry did experience an 'Aryan' chemistry movement, but it was supported only by a few theoretical chemists and could not compete with the obvious economic and military value of modern chemistry, which had been demonstrated so clearly in World War I. The 'useful' disciplines needed only to be purged of politically unreliable and racially objectionable individuals. The apparently useless disciplines would be purged in any case, but also had to struggle for recognition and support from the state and thereby were vulnerable to

political attack. This distinction can also be seen in terms of more practical versus more theoretical disciplines: the latter apparently lacked both utility and immediate applicability.<sup>49</sup>

All the 'Aryan' science movements fit into a similar pattern which in turn mirrors the face of the SA during the early years of the Third Reich: an uncoordinated and often – from the perspective of the National Socialist leadership – unwanted 'revolution from below' pushed for change that went beyond the official synchronization; the state's responding calls for 'evolution, not revolution', a thinly-veiled threat to the National Socialist movement's own rank and file not to overstep its bounds; the obtuse reaction of continued agitation for a 'second revolution' which would achieve what the first had not; and finally a purge of the would-be revolutionaries by the state itself, a 'Night of the Long Knives'.<sup>50</sup>

In other words, because certain disciplines were not obviously useful to the National Socialists, they were vulnerable to political attacks emanating from within their own ranks by scientists or engineers who called for change under the banner of creating a more 'German' or 'Aryan' science. But these attacks or intrigues were not planned by or controlled from the top of the National Socialist hierarchy; instead they often were unwanted and were considered counterproductive. The responsible state authorities usually responded to the 'Aryan' science agitation by insisting that any and all change occur through official channels, but since the 'Aryan' science rebels were rarely satisfied with such prospects, they continued their 'revolution from below'.<sup>51</sup>

Eventually the National Socialist state effectively terminated all the rogue 'Aryan' science or technology movements, although the dates and severity of these measures varied, because in the meantime these disciplines had, sometimes after great effort, demonstrated their willingness and ability to help further the goals of National Socialism. The adherents of 'Aryan' science did not suffer the fate of Ernst Röhm and the SA leadership, but the professional and especially political influence of these researchers was either effectively eliminated or severely diminished.

This pattern for science and engineering under Hitler fits well into the revised Behemoth model. As mentioned above, scientists and engineers were purged as part of the cleansing of the Civil Service bloc. Most of the relatively few 'Aryan' scientists were either attached to or sought support from the Civil Service or relatively weak individuals in the NSDAP. The classic example is Johannes Stark, Nobel Prize-winner and co-founder of 'Aryan Physics', who sought to exploit bureaucratic power within the Reich Education Ministry and the support of National Socialist ideologue Alfred Rosenberg, but whose precipitous fall from political influence was arranged by the SS and the powerful *Gauleiter* (Regional leader of the NSDAP) Adolf Wagner.<sup>52</sup>

In contrast, the scientists and engineers who eventually quashed the

rebellion within their own ranks did so by allying themselves with the technocrats within the National Socialist state, whether in industry, the Armed Forces, or in a special agency of '*Führer* Power' like Hermann Göring's Office for the Four Year Plan or Albert Speer's Armaments Ministry. Such alliances allowed these researchers to escape the relative decline in power of the Civil Service and hitch a ride on the precipitous rise of technocrats within the National Socialist power cartel, beginning in 1936 with massive rearmament, picking up speed with the start of war in 1939, and accelerating after the winter of 1941–42.<sup>53</sup> This alliance of scientists and engineers on the one hand and National Socialist technocrats on the other also had an unforeseen consequence: it hastened the transition towards 'Big Science' in Germany and thereby facilitated the ability of the two post-war Germanies to compete with rivals such as the United States and the Soviet Union.

Thus the newly-found (or new heights of) appreciation of science and engineering by National Socialists was really only a consequence of the ability and desire of technocrats to fill niches within and help to further the goals of National Socialism. Technocracy, like technology, is fundamentally ambivalent and proved compatible with the most extreme aspects of German Fascism. Without technocracy the most barbaric, irrational and backward-looking policies of the Third Reich, including 'euthanasia', involuntary sterilization, the brutal repression of the Socialist movement, ruthless imperialism, ideological warfare on the eastern front, genocide and efforts to create a 'master race', would have been impossible. Scientists and engineers eventually managed to carve out a place for themselves in Hitler's Germany with the help of technocracy, usually not as the perpetrators of crimes against humanity nor as the wagers of aggressive war, but instead often as the technocratic experts or assistants who actively or passively made it all possible.

## 2 Continuity and discontinuity

The contributions to this volume not only cover a broad spectrum of scientific disciplines and technological projects under National Socialism; they also offer individually and collectively a starting point for investigating the question of *continuity* or *discontinuity* in scientific or technological developments before, during and after the Third Reich. All articles share first of all a common span of time, reaching from the Weimar Republic over the twelve years of National Socialist rule into the post-war years, although different authors emphasize different parts of this period. All authors go significantly beyond at least one of the political breaches in 1933 or 1945, whether they investigate a theoretical concept, an institution, a project or a discipline. The choice of this common time period should facilitate the search both for a particularly National Socialist science or

technology and for lines of continuity over the political breaches in the areas of science and technology.

The question of continuity or discontinuity conceals abysses in German history which are closely connected to the difficult digestion since 1945 of the German past.<sup>54</sup> Both concepts are laden with values that in turn have molded the patterns of argumentation and how they have been used, and have normalized the historical judgment of science and technology under National Socialism. The problems bound up with these value-laden concepts will be discussed below.

When the Allies won the Second World War in 1945, they had defeated a criminal National Socialist regime which had murdered, enslaved and oppressed other peoples in the name of German racial superiority. The incomprehensible horror remains. A moral judgment is still required for the historical examination of National Socialism.<sup>55</sup> The Third Reich remains unlike any other historical episode.<sup>56</sup> The historiography of National Socialism, including the study of science and technology during the Third Reich, persistently questions the personal guilt or responsibility of the people involved, as well as their excuses or justifications. The answers to these questions vary greatly.

The National Socialist domination also came to an end for the Germans in 1945. They too distanced themselves from the worldwide horror provoked by German actions during the preceding twelve years, if for no other reason in order to secure their future under the occupying Allied powers. But psychological repression followed such distancing.<sup>57</sup> The interpretation of National Socialism as an 'accident' in the historical development of Germany dominated the German historiography of the post-war period.<sup>58</sup> This characterization also fulfilled an apologetic (in the sense of *apologia*) function by offering a theoretical justification of the simple distancing from these 'foreign bodies' in German history. Moreover, it allowed Germans involved with the post-war reorganization thereby to connect themselves uncritically to unburdened traditions from the Weimar period.<sup>59</sup> The reorganization of the West German research organizations is one example of this uncritical connection with Weimar.<sup>60</sup> This background endows the concepts of continuity and discontinuity with a specific meaning. Continuity is *positive* and means a connection between the post-war science and technology and developments in the Weimar period – but excluding the Third Reich. National Socialism makes up the *negative* discontinuity in German history. This unpleasant epoch has usually been omitted from the literature on the history of science and technology.<sup>61</sup>

It is precisely this omission which touched off the critical examination of science under National Socialism that was renewed in the Federal German Republic during the sixties. The student movement mounted a political protest against the silence over the 'brown past' (a reference to the brown-shirted SA) of the universities and demanded a critical examination. The